WHAT IS CLAIMED IS:

1. An ECR plasma source comprising:

a plasma generating chamber for generating a plasma using the electron cyclotron resonance (ECR) by microwaves and for drawing a plasma flow from an opening;

at least one magnetic generation means having magnetic coils wound for generating static magnetic fields in the plasma generating chamber; and

microwave introducing means for introducing the microwaves transmitted from microwave transmitting means, into the plasma generating chamber, wherein

the plasma generating chamber and the opening of the plasma generating chamber have generally rectangular sectional shapes normal to a direction of the plasma flow generated in the plasma generating chamber;

the magnetic coils of the magnetic generation means are wound in generally rectangular shapes in a plane normal to the direction of the plasma flow; and

the microwave introducing means is so terminated at the end portion as to construct a hollow waveguide for forming standing waves of microwaves in the microwave introducing means, and in the waveguide, a plurality of open areas having at least one opening are disposed at an interval corresponding to the guide wavelength λg of the standing waves of the microwaves, so that microwaves in phase are introduced through the opening into the plasma generating chamber.

2. An ECR plasma source comprising:

a plasma generating chamber for generating a plasma using the electron cyclotron resonance (ECR) by microwaves and for drawing a plasma flow from an opening;

at least one magnetic generation means having magnetic coils wound for generating static magnetic fields in the plasma generating chamber; and

microwave introducing means for introducing the microwaves transmitted from microwave transmitting means, into the plasma generating chamber, wherein

the plasma generating chamber and the opening of the plasma generating chamber have generally rectangular sectional shapes normal to a direction of the plasma flow generated in the plasma generating chamber;

the magnetic coils of the magnetic generation means are wound in generally rectangular shapes in a plane normal to the direction of the plasma flow; and

the microwave introducing means includes a microwave cavity resonator between a terminal end portion having no opening and an end portion having a first opening disposed at a distance of n x ($\lambda g/2$) (n: an integer of 3 or more) from the terminal end portion, and in the microwave cavity resonator, a plurality of open areas having at least one second opening are disposed at an interval corresponding to the guide wavelength λg of the standing waves of the microwaves, so that microwaves in phase are introduced

through the second opening into the plasma chamber.

3. An ECR plasma source as claimed in Claim 1 or 2, wherein the microwave introducing means includes microwave branching means for branching and binding the microwaves transmitted from the microwave transmitting means.

4. An ECR plasma device comprising the ECR plasma source as claimed in Claim 1.

5. An ECR plasma device as claimed in Claim 4, comprising sample moving means; wherein a sample is irradiated at a generally rectangular area of a surface of the sample while being moved by the sample moving means.

6. An ECR plasma device comprising the ECR plasma source as claimed in Claim 2.

7. An ECR plasma device as claimed in Claim 6, comprising sample moving means; wherein a sample is irradiated at a generally rectangular area of a surface of the sample while being moved by the sample moving means.

8. An ECR plasma device comprising the ECR plasma source as claimed in Claim 3.

9. An ECR plasma device as claimed in Claim 8, comprising

sample moving means; wherein a sample is irradiated at a generally rectangular area of a surface of the sample while being moved by the sample moving means.